

The species of *Haplocochlias* (Gastropoda, Skeneidae) from Guadeloupe Island (Caribbean Sea) collected in the Karubenthos Expedition

Federico RUBIO
Pintor Ribera, 4-16^a,
46930 Quart de Poblet (Valencia), Spain

Emilio ROLÁN
Museo de Historia Natural, Universidad de Santiago
Parque Vista Alegre, Campus norte,
15782 Santiago de Compostela, Spain

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KEYWORDS. Skeneidae, *Haplocochlias*, Karubenthos, Guadeloupe Island, new species.

ABSTRACT. Seven species of the genus *Haplocochlias*, collected during the Karubenthos Expedition to the island of Guadeloupe, are studied. Of these, 4 were previously known species and 3 are described as new to science. Each species is illustrated by scanning electron microscope photographs, clarifying its identity and discussing its specific variability, whenever this was possible. Data on the habitat, distribution and bathymetric range of the new species described are provided.

RESUMEN. Se estudian siete especies de *Haplocochlias* recolectadas durante la Expedición Karubenthos en la Isla de Guadalupe. De ellas, 4 eran especies previamente conocidas y 3 se describen como nuevas para la ciencia. Cada una de las especies se ilustra mediante fotografías al microscopio electrónico de barrido, clarificando su identidad y discutiendo su variabilidad específica, cuando esto fue posible. Se aportan datos sobre el hábitat, distribución y rango batimétrico de las nuevas especies descritas.

INTRODUCTION

Rubio, Fernández-Garcés & Rolán (2013) did a full revision of the genus *Haplocochlias* Carpenter, 1864, studying a total of 29 taxa 11 of which were described as new.

In 2012, the Muséum national d'Histoire naturelle, Paris, organized the KARUBENTHOS expedition to the Guadeloupe Islands (Principal Investigator: Philippe Bouchet), organized jointly by the National Park of Guadeloupe, Muséum national d'Histoire naturelle (MNHN), Université des Antilles et de la Guyane (UAG), and Université Pierre et Marie Curie (UPMC), with funding from Fonds Européen de Développement Régional (FEDER) and Port Autonome de la Guadeloupe.

From the material collected in this expedition, ESPINOSA & ORTEA (2013) described another new species. Among the Guadeloupe material of *Haplocochlias* obtained by the MNHN in that expedition, 7 species were found and these are revised in the present work, three of them being new for science.

Material and Methods

The material was picked up from sediments collected by the Karubenthos Expedition (2012), the first inventory of the marine invertebrate of the Guadeloupe Island, organized by the Muséum national d'Histoire naturelle (MNHN). The SEM study of the

shells was made in the Centro de Apoyo Científico y Tecnológico a la Investigación of the University of Vigo supported by the Museo de Historia Natural of the University of Santiago de Compostela.

Abbreviations

ANSP: Academy of Natural Sciences, Philadelphia, U.S.A.

IES: Instituto de Ecología y Sistemática, Havana, Cuba.

FLMNH: Florida Museum of Natural History, Gainesville, U.S.A.

MHN: Museo "Carlos de la Torre", Holguín, Cuba.

MNCN: Museo Nacional de Ciencias Naturales, Madrid, Spain.

MNHN: Muséum national d'Histoire naturelle, Paris, France.

MNH: Museo de la Naturaleza y el Hombre, Santa Cruz de Tenerife, Canary Islands, Spain.

spm: shell with soft parts

s: empty shell

j: juvenile

SYSTEMATICS

Superfamily **TROCHOIDEA** Rafinesque, 1815

Family **SKENEIDAE** Clark, 1851

Genus *Haplocochlias* Carpenter, 1864

Type species by monotypy: *Haplocochlias cyclophoreus* Carpenter, 1864, Cape St. Lucas, Mexico, Recent.

Original description: “*Testa Colloniam simulans, sed haud margaritacea: aperture circularis, varicose: columella haud callosa*”.

Keen (1971): “*Globose shells with fine spiral sculpture, narrow umbilicus and thickened outer lip*”.

Rubio & Rolán (2013) give a short condensed description of the genus: “*The shell is small to minute (1-6 mm in height), turbiniform, with a closed to narrowly opening umbilicus with spiral cordlets inside. Protoconch 3/4 whorl, smooth or with spiral cordlets. Teleoconch with a rounded or slightly angulous periphery; ornamentation formed by numerous spiral cords and axial striae with microtubercles on their interspaces. Aperture prosocline, peristoma continuous; columella sometimes reflected towards the umbilicus, widened at its base with the presence in some species of a depressed area in the crossing point with the umbilical cord. Outer lip wide or fine, crenulated or expanded frontally*”.

Operculum multispiral. Ripidoglossate radula.

Haplocochlias swifti Vanatta, 1913

Fig. 1A

Haplocochlias swifti Vanatta, 1913: 23-24, fig. 3.

Type material. Holotype in ANSP (10292).

Type locality. St. Thomas, Virgin Islands.

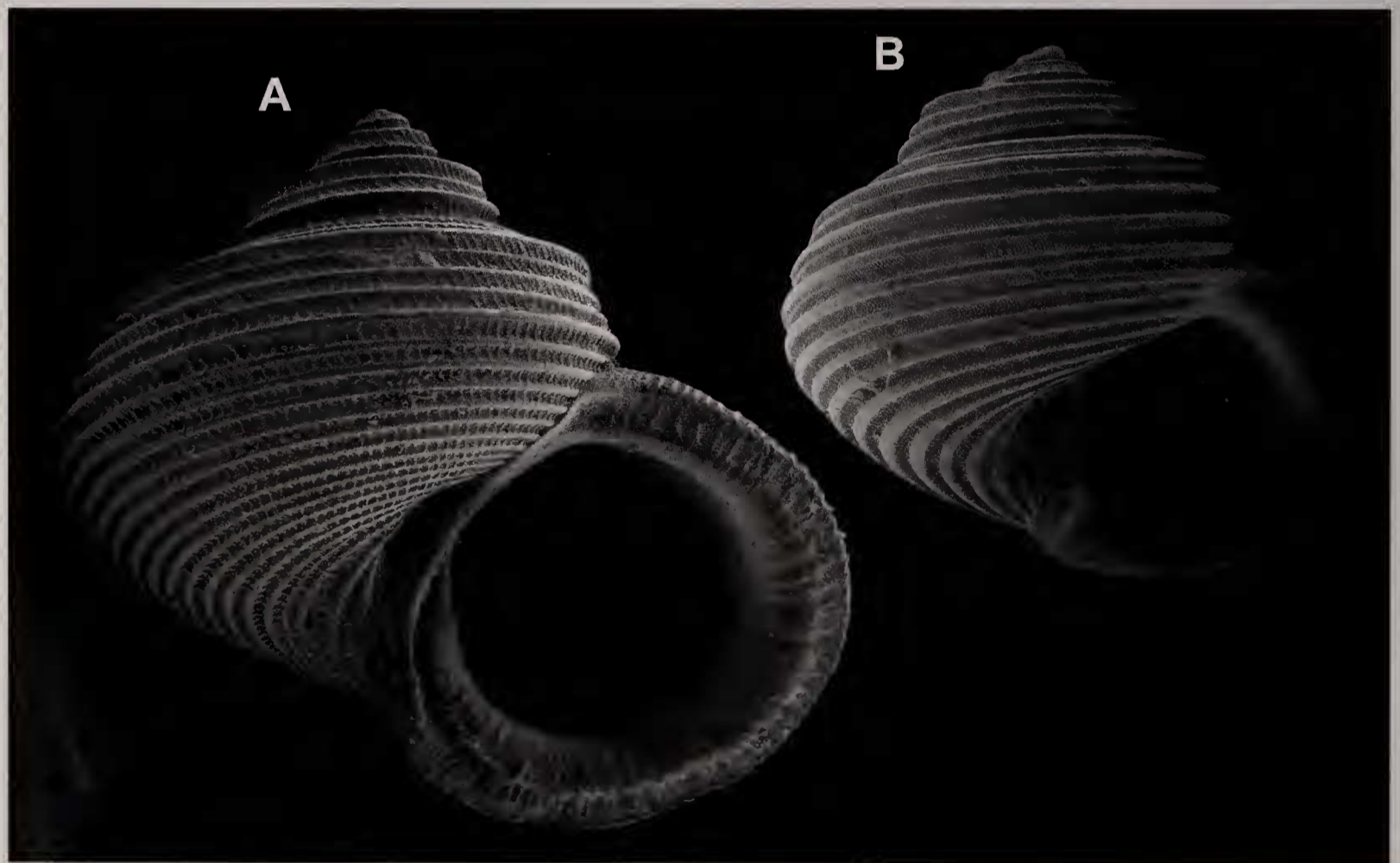
Other material studied. See Rubio *et al.* (2013). Guadeloupe, Karubenthos: 1 s, Grand Cul-de-Sac Marin, Port-Louis (cavern of the Barracudas), Stn. GB16 (16°27.3'N-61°32.1'W), 19 m, rocky bottom (IM-2012-7785).

Habitat. See Rubio *et al.* (2013).

In Guadeloupe Island this species was collected in the interior of a cavern, on rocky bottom at 19 m in depth.

Distribution. See Rubio *et al.* (2013). The present record enlarges the distribution range of this species to Guadeloupe Island.

Remarks. The studied shell present some differences with those studied from Cienfuegos, Cuba: it has three spiral cords instead four on the second whorl of the teleoconch; two cordlets within the umbilicus and the aperture is wider abapically.



Figures 1A-B

A: *Haplocochlias swifti* Vanatta, 1913, shell, 4.8 mm in diameter, Port-Louis, GB16, Guadeloupe Island, 19 m (MNHN). B: *Haplocochlias ortizi* Espinosa, Ortea & Fernández-Garcés, 2005, shell, 2.7 mm in diameter, Port Louis, GS18, Guadeloupe Island, 49 m (MNHN)

Haplocochlias ortizi

Espinosa, Ortea & Fernández-Garcés, 2005

Fig. 1B

Haplocochlias ortizi Espinosa, Ortea & Fernández-Garcés, 2005: 73, figs 1D-F.**Type material.** Holotype in IES, Havana, Cuba. Paratypes in MNCN, MNH and MHN.**Type locality.** Rancho Luna Beach, Cienfuegos, Cuba, 54 m.**Other material studied.** See Rubio *et al.* (2013). Guadeloupe, Karubenthos: 2 s, Basse-Terre, Ilet Pigeon, Stn. GS13 (16°02.4'N-61°45.6'W), 50 m (IM-2012-7823); 1 s, Basse-Terre, Port Louis, Stn. GB14 (16°23.74'N-61°32.07'W), 49 m, slope (IM-2012-7824); 1 s, Grand Cul-de-Sac Marin, Port Louis, Stn. GS18 (16°23.7'N-61°32.0'W), 49 m, slope (IM-2012-7825); 1 s, Grand Cul-de-Sac Marin, Stn. GD03 (16°23.2'N-61°32.0'W), 50 m (IM-2012-7826).**Habitat.** Circalitoral species collected between 40 - 55 m both on hard and in soft bottoms. In Cienfuegos, Cuba the type material was found in sediments from coralline-sandy bottom at 54 m (RUBIO *ET AL.* 2013); in Guadeloupe Island it has been collected on a rocky bottom (slope of the reef) at 49-50 m depth.**Distribution.** Only known previously from Rancho Luna Beach, Cienfuegos, Cuba, its type locality (Rubio *et al.* 2013); the present record extends its distribution range to the Guadeloupe Island.**Remarks.** All the shells examined of *Haplocochlias ortizi* from Guadeloupe present some constant morphological characters:

-The second whorl of the teleoconch with 4 spiral whorls and the last one with 17, lacking of cordlets within the umbilicus.

-The external lip is finer, with a crenulate margin due the spiral cords.

-The columella has on its base 2 denticles of triangular form.

-The umbilicus is very narrow, partially occluded by the reflexion of the columella.

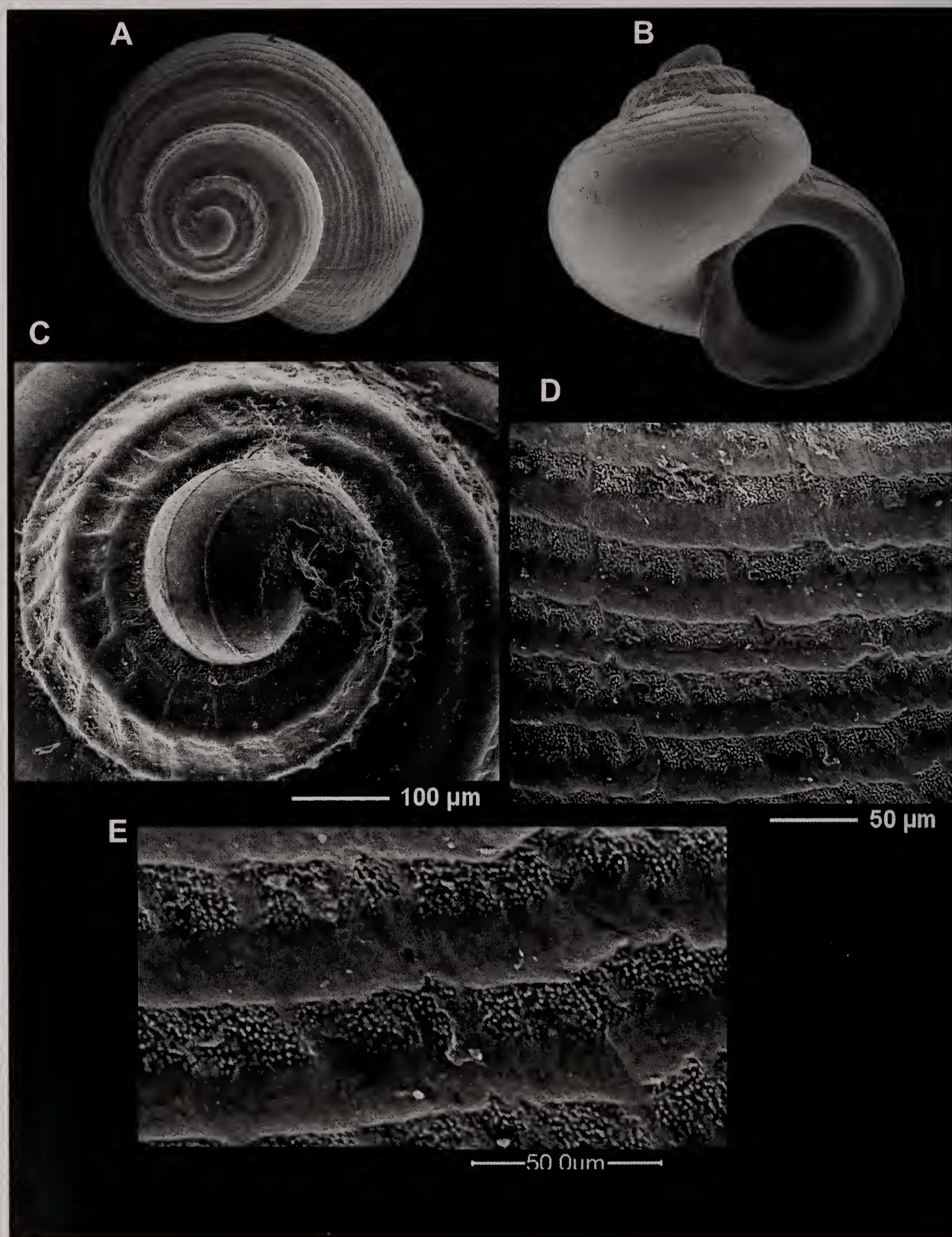
These characters differentiate clearly the individuals from Guadeloupe of those from Cienfuegos (type locality). However we think that they are not enough for a specific separation and must be considered as within the species variability.

Haplocochlias lupita

Espinosa & Ortea, 2013

(Figs 2A-E)

Haplocochlias lupita Espinosa & Ortea, 2013: 106-107, pl. 1, fig. A.**Type material.** The holotype in MNHN IM 2000-27399 (not examined).**Type locality.** Les Tubes, N. Fajou islet, Guadeloupe.**Other material studied.** Guadeloupe, Karubenthos: 1 s, Petite-Terre, Stn. GB31 (16°09.7'N-61°07.7'W), 15 m (IM-2012-7822).**Description.** See Espinosa & Ortea (2013). We add the following complementary information: the protoconch has about 3/4 of a whorl, measuring about 260 μ m in diameter and showing 3 evident spiral cordlets. The teleoconch has 2 1/2 spiral whorls and its periphery is rounded not angular. On the first whorl there are 3 spiral cords, and between them little prosocline fine axial ribs. Here, the spiral cords are more elevated and angle the periphery forming rectangular spaces with the axial ribs; below the first whorl, the number of the spiral cords increases but between them it is always possible to see isolated and slightly irregular axial riblets. Between ribs and cords, there are numerous micro-tubercles, only visible under strong magnification. In apertural position 2-3 spiral cords can be observed on the first whorl and 5-6 on the last one; in the last half whorl the spiral cords are bifurcated and so they are more numerous near the external lip. On the last whorl the spiral cords only cover the dorsum of the shell, the lower part being smooth, with faint growth lines. Umbilicus is narrow and deep not delimited by cord or carina. Aperture is round and prosocline; parietal area is covered by a strong layer; columella is almost straight, wide and reflected at its base; outer lip is strong, lacking denticles on its inner lip and thickening widely on its external lip.**Dimensions.** Our shell is 1.47 mm in height and 1.50 mm in diameter.**Habitat.** Empty shell found in infralittoral sediment.**Distribution.** Only known from Guadeloupe.**Remarks.** By its wide lip and lack of axial ribs on the last whorl, this species can be placed in the *cyclophoreus* group.Morphologically *Haplocochlias lupita* is rather similar to *Haplocochlias karukera* spec. nov. from which it can be separated by its lesser size and the larger size of its protoconch; by the strong spiral cords on its first whorl; and the numerous small spiral cords on the last one which are only on the dorsum, disappearing on the lower part of the last whorl.



Figures 2A-E

Haplocochlias lupita Espinosa & Ortea, 2013. A-B. shell, 1.5 mm in diameter, Guadeloupe Island, GB31, Petite-Terre; 15 m (MNHN); C. Protoconch; D-E. Microsculpture and detail.

Haplocochlias loperi Rubio, Rolán & Lee, 2013
Figs 3A-F

Haplocochlias loperi Rubio, Rolán & Lee, 2013 (in Rubio *et al.*, 2013 : 66, fig. 14).

Type material. Holotype and 2 paratypes in FLMNH (457010-11).

Type locality. The G-Spot, French Cay, 18 m, Turks & Caicos Islands.

Other material studied. (15 s): Guadeloupe, Karubenthos: 7 s, Grand Cul-de-Sac Marin, external slope, Stn. GS04 (16°22.0'N-61°38.0'W), 11 m, coralline bottom (IM-2012-7814); 1 s, Grand Cul-de-Sac Marin, external slope, Stn. GB02 (16°22.0'N-61°38.0'W), 11 m, coralline bottom (IM-2012-7816); 1 s, Grande-Terre, Vaisseaux bank, Stn. GD66 (16°08.2'N-61°17.3'W), 33 m (IM-2012-7817); 1 s, Petite-Terre, Stn. GS36 (16°07.9'N-61°12.5'W), 50 m (IM-2012-7818); 2 s, Grand Cul-de-Sac Marin, Passe à Caret, Stn. GS29 (16°22.3'N-61°38.1'W), 29 m, bottom of *Thalassia* (IM-2012-7819); 3 s, Grand Cul-de-Sac Marin, Stn. GB26 (16°22.3'N-61°38.1'W), 29 m, rocky bottom (IM-2012-7821).

Description. Shell very small, turbinate, with a robust appearance, wider than high (H/D: 0.89), spire formed by 3 $\frac{3}{4}$ rapidly expanding whorls. The protoconch has $\frac{3}{4}$ of whorl, measuring about 260 μ m and with three thin spiral cords. The teleoconch has a little less than 3 whorls ornamented by thick, prominent spiral cords, axial ribs and microgranules. In apertural view there are 2 spiral cords on the first whorl, three on the second and 10-11 cords on the last one, distributed between the suture and the umbilicus. These cords are narrower than the interspaces, which are concave.

The axial ribs are strong, somewhat prosocline, regularly spaced and occupying the whole space between cords, which is slightly concave, forming oblique spaces which are progressively transformed into rectangular. All the surface of the teleoconch is covered by microgranules. Aperture rounded and prosocline; parietal area covered by a thin callous coat; columella almost straight, very wide at its base, scarcely reflected; outer lip thickened and frontally expanded, with the margin slightly crenulated by the numerous spiral cordlets, showing weak, long, elongated and wide denticles on its inner face. Umbilicus small, partially covered by the columellar reflection; on its inner wall there are thin growth lines and one spiral cordlet.

Dimensions. The shells studied from Guadeloupe have a maximum diameter between 1.42 and 1.37 mm.

Habitat. Infralittoral to circalittoral species living in rocky and coralline bottom, and in *Thalassia* meadows between 11-50 m.

Distribution. Known from Turks & Caicos Islands, its distribution range is now extended to Guadeloupe Island.

Remarks. The shells collected from Guadeloupe are in better condition than the holotype of the species.

Haplocochlias karukera spec. nov.
Figs 4A-F

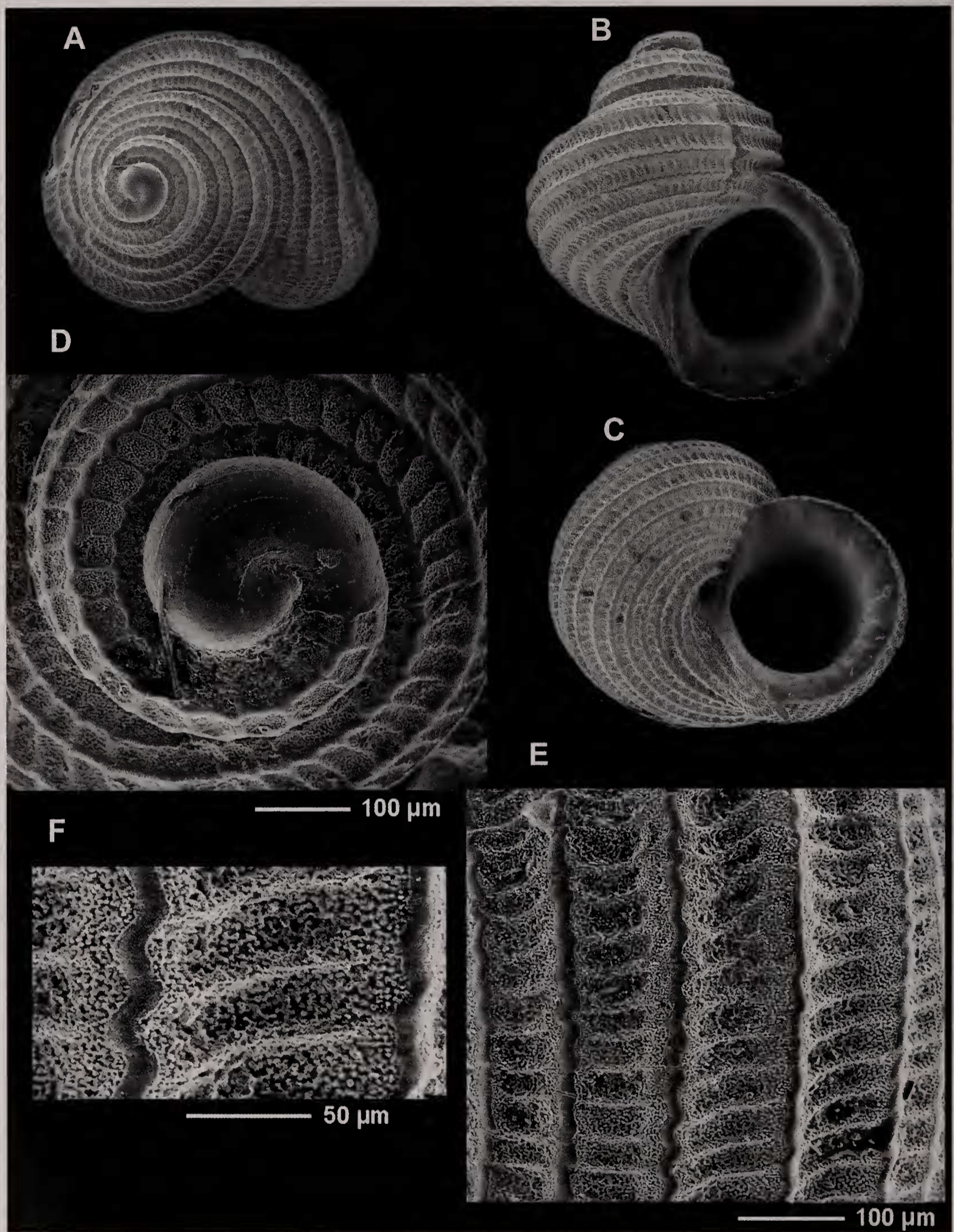
Type material. Holotype (Fig. 4A) in MNHN (IM 2012-7795); 3 paratypes in MNHN (IM-2000-27721) from type locality.

Type locality. Petite-Terre, west high bottom, Stn. GB36 (16°09.5'N-61°10.05'W), 15 m.

Material studied. (16 s): Guadeloupe, Karubenthos: 1 s, Grand Cul-de-Sac Marin, external slope, Stn. GB02 (16°22.0'N-61°38.0'W), 11 m, coralline bottom (IM-2012-7792); 4 s, Petite-Terre, west high bottom, Stn. GB36 (16°09.5'N-61°10.05'W), 15 m (IM-2012-7795) (holotype IM-2012-7795, 3 paratypes IM-2000-27721); 1 s, Grande-Terre, Vigie point (grotte Amedier), Stn. GS26 (16°30.0'N-61°28.8'W), 16 m, rocky bottom (IM-2012-7786); 1 s, Grande-Terre, Vaisseaux bank, Stn. GD65 (16°08.1'N-61°17.01'W), 20 m (IM-2012-7787); 1 s, Basse-Terre, Tête à l'Anglais, Stn. GS08 (16°22.9'N-61°45.9'), 23 m, rocky bottom (IM-2012-7788); 1 s, Petite-Terre, Stn. GS34 (16°09.7'N-61°07.7'W), 15 m (IM-2012-7789); 1 s, Petite-Terre, west high bottom, Stn. GS39 (16°09.5'N-61°10.5'W), 16 m (IM-2012-7790); 1 s, Grande-Terre, Vigie Point (Pointe Montagnier), Stn. GB22 (16°30.6'N-61°28.5'W), 12 m (IM-2012-7791); 1 s, Grand Cul-de-Sac Marin, Anse Tarare, Stn. GM33 (16°15.4'N-61°11.9'W), 6 m (IM-2012-7793); 2 s, Petite-Terre, Stn. GB31 (16°09.7'N-61°07.7'W), 15 m (IM-2012-7794); 2 s, Grand Cul-de-Sac Marin, external slope, Stn. GS04 (16°22.0'N-61°38.0'W), 11 m, coralline bottom.

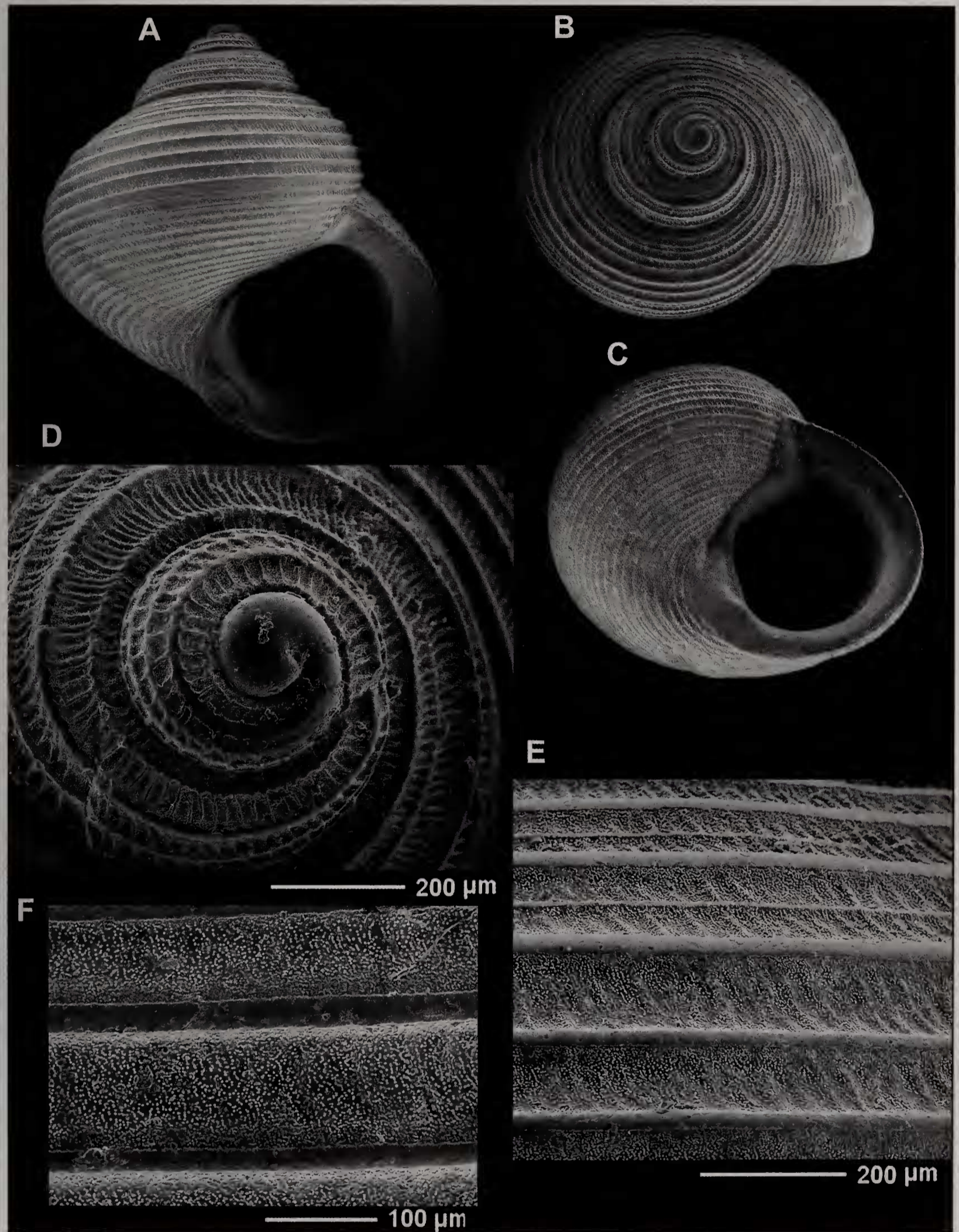
Description. Small sized shell (< 4 mm), turbiniform, robust, spire formed by 3 $\frac{1}{2}$ - 4 whorls of quick development; periphery rounded, not angular; umbilicus absent.

The protoconch has $\frac{3}{4}$ of a whorl with three fine spiral cordlets on its surface, measuring about 210 μ m. The teleoconch is formed by 3 $\frac{1}{4}$ whorls, completely covered by spiral cords, with dense axial riblets and micro-granules in the interspaces. In the apertural view 4 cords can be seen on the first whorl, 7 on the second, 9 on the third and 28 on the last one. The interspaces are wider than the cords and they are completely covered by axial ribs and micro-granules; the axial ribs on the first whorls are wider and are more separated between them forming a quadrangular reticule; on the following whorls they become finer and more numerous. On the last half whorl, the axial ribs almost disappear and at same time a fine spiral cordlet



Figures 3A-F

Haplocochlias loperi Rubio, Rolán & Lee. A-C. Shells, 1.42, 1.37, 1.54 mm in diameter, Grand Cul-de-Sac Marin, Guadeloupe, GB26, 29 m (MNHN); D. Protoconch; E-F. Microsculpture and detail.



Figures 4 A-F

Haplocochlias karukera spec. nov. **A.** Holotype, 3.3 mm in diameter, GB36, Petite-Terre, Guadeloupe (MNHN); **B.** Paratype: 2.8mm in diameter from type locality; **C.** Shell, 3.06 mm, GB02, Grand Cul-de-Sac Marin (MNHN); **D.** Protoconch of the shell of Fig. C; **E-F.** Microsculpture and detail (from the holotype).

arises between the spiral cords, so the number of cords on the outer lip is much higher. Aperture is rounded, prosocline; outer lip is very thick; many spiral cords on its external margin and a strong thickened lip can be observed, and on its inner margin there is no denticulation; columella almost straight, very wide at its base and reflected towards the umbilicus, covering it completely, while on its base an relatively large elliptical depression can be seen; parietal area covered by a thin callous coat.

Only empty shells have been found; the soft parts of the species are unknown.

Dimensions. The holotype is 3.30 mm in diameter and 3.57 mm in height.

Habitat. Only empty shells have been found in infralittoral rocky and coralline bottoms between 0-23 m in depth.

Distribution. Only known from Guadeloupe Island.

Remarks. *Haplocochlias karukera* spec. nov. is morphologically close to *Haplocochlias risoneideneryae* Barros, Santos, Santos, Cabral & Acioli, 2002, being distinguished from this species by having fine spiral lines on the protoconch, the periphery of the shell being completely rounded, not angular; by lacking denticulation on the inner margin of the outer lip and by the elliptical depression on the base of the columella.

By the strongness of the shell and shape of the external lip, this species can be placed within the *cyclophoreus* group.

Etymology. The specific name is the old name of the Guadeloupe Island, by apposition "Karukera" given by the Arawak Indians.

Haplocochlias arawakorum spec. nov.

Figs 5A-E

Type material. Holotype (Figs. 5A-B) in MNHN (IM-2012-7815) and 7 paratypes (MNHN IM-2000-27722).

Type locality. Petite-Terre, west high bottom, Stn. GS39 (16°09.5'N-61°10.5'W), 16 m.

Material studied. Guadeloupe, Karubenthos: 8 s, Petite-Terre, west high bottom, Stn. GS39 (16°09.5'N-61°10.5'W), 16 m (holotype IM-2012-7815), 7 paratypes (IM-2000-27722).

Description. Shell very small (< 2 mm), turbiniform, white in colour, with a spire with more than 3 rapidly expanding whorls, separated by a deep suture. The protoconch has 3/4 whorls and measures about 230 µm in diameter, having 3 thin spiral cords. Teleoconch with about 2 3/4 whorls, ornamented with strong spiral cords, prosocline axial striae in the spaces between the cords, and micro-granules. The cords are narrower than their interspaces; in apertural position, on the first and second whorls 4 spiral cords can be observed, while there are 12 cords in the last one, more pronounced and also more separated from one another and placed at the periphery of the shell. The axial striae form hexagonal spaces on the first whorl of the teleoconch and quadrangular spaces on the second, which become rectangular on the last one. The complete surface of the teleoconch is covered by micro-granules. Aperture rounded and prosocline; parietal area covered by a thin callous coat; columella straight, wide and reflected towards the umbilicus, forming an elongated denticle which widens towards the base and has 2 small tubercles on its surface. Outer lip very wide, with the margin modified by the numerous spiral cordlets, while on its outer part an important labial thickening is formed and on its inner part 10 or more denticles of different shapes and size can be seen. Umbilicus small, partially occluded by the reflection of the columella, with 2-3 spiral threads inside. The outer margin of the outer lip forms a characteristic thickening similar to that of some species of the genus *Nassarius* (Nassariidae).

Only empty shells have been found; the soft parts of the species are unknown.

Dimensions. The holotype measures 1.55 mm in height and 1.37 mm in diameter (H/D: 1.13)

Habitat. Empty shells obtained from infralittoral sediment collected at 16 m in depth.

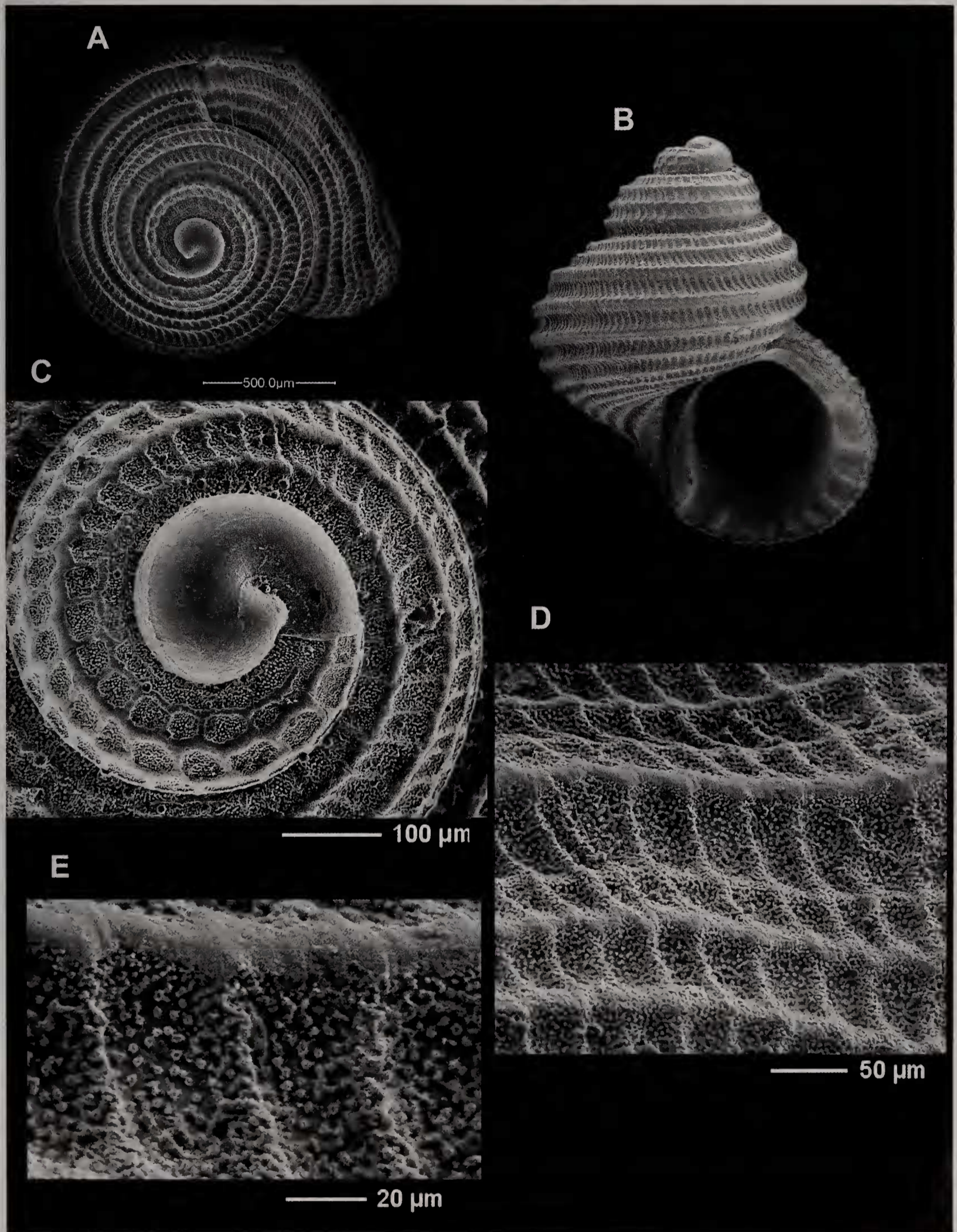
Distribution. Known only from its type locality.

Remarks. *Haplocochlias arawakorum* spec. nov. is morphologically very similar to *H. minusdentatus* Rubio, Rolán & Lee, 2013, a species from which can be separated by the smaller protoconch, its wider and more prominent spiral cords; and by the denticles of the inner part of the outer lip, which are more numerous and prominent and by the elongate denticle placed in the base of the columella.

Etymology. The specific name is after the "Arawak", the ancient people who inhabit the island of Guadeloupe

Figures 5A-E

Haplocochlias arawakorum spec. nov. A-E. Holotype, 1.37 mm in diameter, GS39, Petite-Terre, Guadeloupe (MNHN); C. Apex and protoconch; D-E. Micro-sculpture and detail



Haplocochlias christopheri spec. nov.

Figs 6A-E

Type material. Holotype (Fig. 6A) in MNHN (IM-2012-7814); 6 paratypes in MNHN (IM-2000-27723).

Type locality. Grand Cul-de-Sac Marin, external slope, Stn. GS04 (16°22.0'N-61°31.0'W), 11 m.

Material studied. (17 s): Guadeloupe, Karubenthos: 7 s, Grand Cul-de-Sac Marin, external slope, Stn. GS04 (16°22.0'N-61°31.0'W), 11 m (IM-2012-7814) (holotype IM-20127814, 6 paratypes IM-2000-27723); 8 s, Petite-Terre, West high bottom, Stn. GS39 (16°09.5'N-61°10.5'W), 16 m (IM-2012-7815); 2 s, Grand Cul-de-Sac Marin, in front of Fajou islet, Stn. GS31 (16°21.6'N-61°34.7'W), 29 m (IM-2012-7820).

Description. Shell very small, turbiniform, strong and robust, globose, almost as wide as it is high (H/D: 1.20), with a spire formed by about 3 ½ quickly increasing whorls. The protoconch has ¾ whorls, measuring about 230 µm and on it four fine but well visible cordlets can be seen. The teleoconch has 2 ½ whorls, its periphery is bicrenated and its ornamentation is formed by strong spiral cords, some very prominent, axial striae and microgranules. The spiral cords are narrower than their interspaces; in apertural view, 3 spiral cords can be seen on the first whorl and 13 cords on the last one distributed between the suture and the umbilicus; in each whorl there are 2-3 more prominent cords which make the profile angulated. The interspaces between cords are of similar size in the sutural and peripheral areas, but in the base they become narrower and closer.

The axial striae are somewhat prosocline, its distribution in the spaces between the cords in regular, forming quadrangular spaces totally covered by microtubercles.

Aperture rounded, prosocline, peristome continuous; parietal area covered by a strong callous coat; the columella is almost straight, widening towards the base and scarcely reflected towards the umbilicus; outer lip very wide, with a fine margin not modified by the spiral cords, no labial thickening and its internal margin has no denticles. Umbilicus narrow, not occluded by the reflexion of the columella, while on its inner part only axial growth lines can be observed.

Only empty shells have been found; the soft parts of the species are unknown.

Dimensions. The holotype measures 1.33 mm in height and 1.27 mm in diameter (H/D: 0.95).

Habitat. Empty shells have been collected in infralittoral coralline sediment samples collected in a depth range 11-29 m.

Distribution. Only known from Guadeloupe Island.

Remarks. *Haplocochlias christopheri* spec. nov. is very similar on its general form to *H. bieleri* Rubio, Rolán & Lee, 2013, but the latter has somewhat larger spiral cords which angle the periphery, has many more spiral cords and numerous denticles on the inner part of the external lip.

Etymology. The specific name is after Christopher Columbus (Cristóbal Colón), the first European explorer to visit the island.

CONCLUSIONS AND COMMENTS

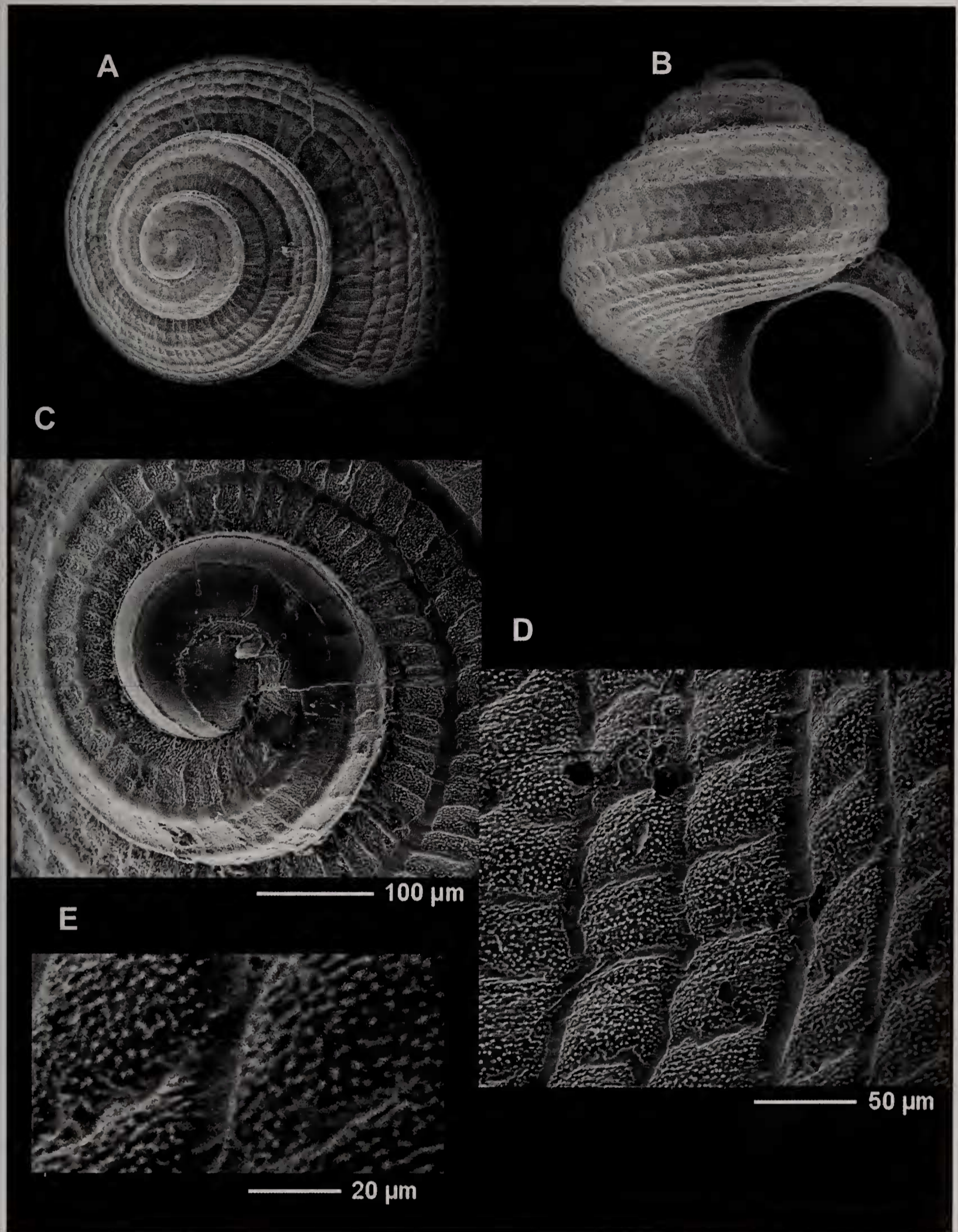
After the revision of the genus *Haplocochlias* made by Rubio *et al.*, (2013), the description of a new Caribbean species by Espinosa & Ortea (2013) and the present work (in which three new species are described), we have seen the great diversification that occurred during the expansion of the genus in the Caribbean. From the 32 known species, 6 have been found from the Eastern Pacific coast, while 26 live in the Western Atlantic; from these, 2 are from Brazil, 2 from Panama, 1 from Louisiana, 1 from Bermuda and the remaining are known from the Caribbean islands. The geographical distribution of many of the studied species was restricted to specific islands, different species are often found near one island; this underlines the fact that the large number of islands as well as the huge variety of ecological niches have facilitated speciation.

Of all known species, *Haplocochlias swifti* has the largest of distribution area, having been recorded from Florida, Cuba, Virgin Islands, Costa Rica, Bocas de Toro Islands (Panama), Curacao and Bonaire and Fernando de Noronha (Brazil), being now also shown its presence in Guadeloupe. *H. nunezi* has been found in Cuba, Bahamas, Virgin Islands and Nicaragua. The remaining species are mostly limited to specific islands, although considering them "endemic" is risky because of the lack of intensive surveys in many of the studied areas.

About the areas with the largest number of species we point out Cuba, with 9 species, Guadeloupe with 7 species, Florida with 5 species and Bahamas with 3. We note that the three first areas mentioned can be considered as the most intensively sampled, and also that Cuba spans the largest area and hence has a higher probability of presenting different habitats.

ACKNOWLEDGEMENTS

The material was collected in Guadeloupe in May 2012 during the Karubenthos expedition (Principal Investigator: Philippe Bouchet), organized jointly by the National Park of Guadeloupe, Muséum National d'Histoire Naturelle (MNHN), Université des Antilles et de la Guyane (UAG), and Université Pierre et Marie Curie (UPMC), with funding from Fonds Européen de



Figures 6A-E

Haplocochlias christopheri spec. nov. **A.** Holotype, 1.27 mm in diameter, Grand Cul-de-Sac Marin, GS04, 11 m (MNHN); **B-E.** Paratype, 1.15 mm in diameter, same locality (MNHN); **C.** Protoconch; **D-E.** Micro-sculpture and detail.

Développement Régional (FEDER) and Port Autonome de la Guadeloupe.

First at all the authors thank Philippe Bouchet for his trust, giving them constant access to the MNHN material for study. In our work we have received significant help from members of the MNHN staff: Virginie Héros, Philippe Maestrati and Pierre Lozouet. For the study of the small species, numerous Scanning Electron Microscopy (SEM) photographs were necessary; they were taken in the Centro de Apoyo Científico y Tecnológico a la Investigación (CACTI) of the University of Vigo, by Jesús Méndez and Inés Pazos. Mabel Fraga, Director of the Museum of Natural History "Luis Iglesias" of the University of Santiago of Compostela, continually supported our work.

António A. Monteiro revised the English text.

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